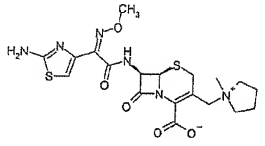
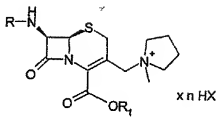
Claims

1. A process for producing a compound of formula I



I

wherein a compound of formula II



II

wherein

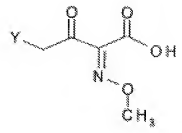
R_1 is a negative charge or a trialkylsilyl group,

R is hydrogen or a trialkylsilyl group,

n is 0 - 2 and

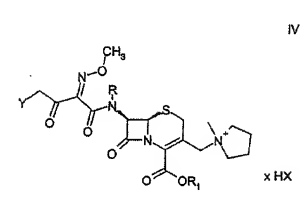
X signifies chloride, bromide or iodide

is reacted with a reactive derivative of formula III



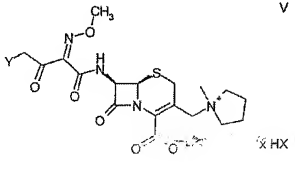
III

wherein Y signifies halogen, to form a compound of formula IV



IV

the silyl protecting groups, if present, are removed, or the compound of formula IV as the acid addition salt of formula V is isolated and the compound of formula IV



V

or the compound of formula V is cyclised with thiourea, and subsequently the compound of formula I is isolated.

2. A process as claimed in claim 1, wherein the compound of formula II is produced from its mono- or di-hydrogen halide adducts.

3. A process as claimed in claim 1 or 2, wherein pyrrolidinium-1-[(7-amino-2-carboxy-8-oxo-5-thia-1-azabicyclo[4.2.0]oct-2-en-yl)methyl]-iodide monohydrate is used.

4. A process as claimed in claim 1 or 2, wherein pyrrolidinium-1-[(7-amino-2-carboxy-8-oxo-5-thia-1-aza-bicyclo[4.2.0]oct-2-en-yl)methyl]-chloride is used, optionally in solvated form.

5. A process as claimed in claim 1 or 2, wherein pyrrolidinium-1-[(7-amino-2-carboxy-8-oxo-5-thia-1-aza-bicyclo[4.2.0]oct-2-en-yl)methyl]-dihydrochloride is used, optionally in solvated form.

6. A compound of formula V, wherein Y and X are Cl.

7. A compound as claimed in claim 6 in crystalline form.

8. A process as claimed in claim 1, wherein 4-chloro-2-methoxyimino-3-oxo-butyryl chloride is used as the reactive derivative of formula III.

9. A process as claimed in any of claims 1 to 5 or 8, wherein prior to crystallisation of the compound of formula I, any bromide or iodide ions that may be present are removed by ion exchanger.

Biochemie GmbH

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